In the Claims:

Please cancel claims 1-4 and 9-11 and amend claims 5, 7 and 12. The status of all claims is as follows:

1. (Canceled)

2. (Canceled)

3. (Canceled)

4. (Canceled)

5. (Currently amended) A method for estimating digital data received over a potentially noisy channel which adds intersymbol interference or additive noise, or a combination of intersymbol interference or additive noise, the method comprising steps of:

inputting data received from the noisy channel into a SISO MMSE equalizer;

inputting a set of priors over symbol values of the noisy channel including a separate prior for each received noisy channel symbol value, into the SISO MMSE equalizer;

equalizing, by an MMSE equalization in the SISO MMSE equalizer, the data received from the noisy channel and the set of priors over symbol values to produce a symbol value estimate;

mapping output of the SISO MMSE equalizer onto priors over the symbol values to produce a confidence indication in each of the symbol value estimates as a function of time;~~The method acording to claim 4,~~

wherein said step of equalizing excludes symbol value estimates which are functions of an input distribution of a current symbol being equalized;

wherein digital data transmitted over said potentially noisy channel is error correction encoded prior to transmission, the step of mapping output of the SISO MMSE equalizer comprising steps of:

passing output of the SISO MMSE equalizer into a SISO error correction decoder;

using an output of said SISO error correction decoder as the set of priors over symbol values;

repeating all steps of the method until a predetermined convergence criterion is reached between said SISO error correction decoder and said SISO MMSE equalizer;

wherein digital data transmitted over said potentially noisy channel is interleaved prior to transmission and a step of de-interleaving is conducted on the output of the SISO MMSE equalizer prior to said step of passing output of the SISO MMSE equalizer into the SISO error correction decoder.

6. (Original) The method according to claim 5, wherein said SISO error correction decoder has its output restricted to exclude symbol value estimates which are functions of an input distribution of a current symbol being decoded.

7. (Currently amended) A method for estimating digital data received over a potentially noisy channel which adds intersymbol interference or additive noise, or a combination of intersymbol interference or additive noise. the method comprising steps of:

inputting data received from the noisy channel into a SISO MMSE equalizer;

inputting a set of priors over symbol values of the noisy channel including a separate prior for each received noisy channel symbol value, into the SISO MMSE equalizer;

equalizing, by an MMSE equalization in the SISO MMSE equalizer, the data received from the noisy channel and the set of priors over symbol values to produce a symbol value estimate;

mapping output of the SISO MMSE equalizer onto priors over the symbol values to produce a confidence indication in each of the symbol value estimates as a function of time ~~The method according to claim 1,~~ wherein said step of equalizing comprises a fast update equalization of the order M^2 (quadratic in the number of parameters M) which exploits redundant computations in successive equalizer computations.

8. (Original) The method according to claim 7, wherein the fast update equalization is performed by applying the matrix inversion lemma to a matrix to be inverted in a design of equalization coefficients for the SISO MMSE equalizer.

9. (Canceled)

10. (Canceled)

11. (Canceled)

12. (Original) A data decoding device comprising:

a SISO MMSE equalizer;

a SISO decoder, the decoder exchanging symbol estimates with the SISO MMSE equalizer, the SISO MMSE equalizer produces an MMSE linear estimate, and

corresponding output distribution $\hat{b}[n]$ of transmitted symbols $\hat{b}[n]$, and mapping the linear estimate's output distribution to an output set of priors over the symbols π^{E}_{OUT};

~~The device according to claim 11,~~ wherein said equalizer maps the estimates by treating the output distribution $\hat{b}[n]$ as conditionally Gaussian, and distributed about the symbol values.

13. (Previously Presented) The device according to claim 12, wherein the output distribution mapping is defined as:

$$Prob\{b[n]=1|\hat{b}[n]\}=\frac{1}{2}\left(1+tanh\left(\frac{\hat{b}[n]}{\sigma^2_{\hat{b}}}\right)\right),$$

where $\sigma^2_{\hat{b}}$ is the variance of the conditional output distribution given the symbol $\hat{b}[n]=$ sign $(\hat{b}[n])$, and the estimate $\hat{b}[n]$ cannot be a function of $\pi^{E}_{IN}[n]$, and expectations are taken over a distribution of the symbols which excludes $\pi^{E}_{IN}[n]$ for the calculation of $\hat{b}[n]$.

14. (Previously Presented) The device according to claim 12, wherein the following steps for computing the output distribution given the observations, x[n] and the input distribution π^{E}_{IN} is used by the MMSE equalizer:

a. Create buffers for the priors, the signal x[n], the expectations $\vec{bb}[n] = E\{b[n]\bar{b}[n]\}$, the correlation matrix $B[n] = E\{\bar{b}[n]\bar{b}[n]^T\}$, and the means $\vec{mb}[n] = E\{\bar{b}[n]\}$

$\vec{\pi}^{(n)} \triangleq [\pi^{(n)}[-N_1 - L_2], \ldots, \pi^{(n)}[0], \ldots, \pi^{(n)}[N_2 + L_1]]^T$

$\vec{x}^{(n)} \triangleq [x^{(n)}[-N_1], \ldots, x^{(n)}[0], \ldots, x^{(n)}[N_2]]^T$

$\vec{bb}^{(n)} \triangleq [bb^{(n)}[-N_1 - L_2], \ldots, bb^{(n)}[0], \ldots bb^{(n)}[N_2]]^T = [0, \ldots 0, 1, 0, \ldots, 0]^T$

b. Initialize buffers for priors $\vec{\pi}^{(n)}$ and data $\vec{x}^{(n)}$, in terms of the signal x[n] and the input π_{IN}^E

$\vec{x}^{(0)} = [0, 0, \ldots, x[0], x[1], \ldots, x[N_2]]^T$

$\vec{\pi}^{(0)} = [0, 0, \ldots, 0, \pi_{IN}^E[0], \pi_{IN}^E[1], \ldots, \pi_{IN}^E[N_2 + L_1]]^T$

c. Loop over the data for n= 0, . . ., N:

$\pi^{(n)}[0] = ½$

$\vec{mb}^{(n)} = 2\,\vec{\pi}^{(n)} - 1$

$B = \vec{mb}^{(n)}\,\vec{mb}^{(n)T}$

diag(B) = diag (1, 1, ..., 1)

$\vec{c}[n] = [H\,(B - \vec{mb}^{(n)}\vec{mb}^{(n)T})\,H^T + \sigma_w^2 I]^{-1} H\,\vec{bb}^{(n)}$

$\hat{b}[n] = \vec{mb}^{(n)} + \vec{c}^{(n)T}\,(\vec{x}^{(n)} - H\,\vec{mb}^{(n)})$

$\vec{x}^{(n+1)} = [x^{(n)}[-N_1 + 1], \ldots, x^{(n)}[N_2], 0]$

$\vec{\pi}^{(n+1)} = [\pi^{(n)}[-N_1 - L_2 + 1], \ldots, \pi^{(n)}[N_2 + L_1], 0]$

if $n < N - N_2$

$x^{(n+1)}[N_2] = x[n + 1 + N_2]$

if $n < N - N_2 - L_1$

$\pi^{(n+1)}[N_2 + L_1] = \pi_{IN}^E[n + 1 + N_2 + L_1]$

d. Estimate output variance $\sigma_{\hat{b}}^2 = (var(\hat{b}|\hat{b}>0) + var(\hat{b}|\hat{b}<0))/2$

e. Determine output priors, $\pi_{OUT}^E = 1/2\,(1 + tanh\,(\dfrac{\hat{b}[n]}{\sigma_{\hat{b}}^2}))$.